

Claims

What is claimed is:

1. A method for generating call detail records (CDRs) in a communications network environment that supports number portability, the method comprising:
 - (a) passively copying a plurality of signaling messages relating to a plurality of different calls or transactions;
 - (b) automatically correlating signaling messages that relate to the same call or transaction to produce a CDR usable by a plurality of different network data collection applications;
 - (c) determining whether number portability processing is required for the CDR;
 - (d) in response to determining that number portability processing is required for the CDR, querying a network number portability database using information contained in one of the received signaling messages;
 - (e) incorporating information returned from the network number portability database into the CDR; and
 - (f) delivering the CDR to a downstream system.
2. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying ISDN user part (ISUP) messages from an SS7 signaling link.

3. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying transaction capabilities application part (TCAP) messages from an SS7 signaling link.
4. The method of claim 1 wherein passively copying a plurality of signaling
5 messages includes passively copying session initiation protocol (SIP) messages from an IP signaling link.
5. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying H.225 messages from an IP signaling link.
- 10 6. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying the signaling messages using a communication link probe.
7. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying the signaling messages using a
15 probeless network monitoring system.
8. The method of claim 1 wherein passively copying a plurality of signaling messages includes passively copying a plurality of signaling messages at a location in the communications network environment independently of where number portability lookups are performed.
- 20 9. The method of claim 1 wherein automatically correlating the message parameters into a CDR includes automatically correlating the messages

into a CDR including a superset of the parameters required by the network data collection applications.

10. The method of claim 1 wherein determining whether number portability processing is required includes determining whether at least one of a calling party number and a called party number in one of the received signaling messages is within a portable exchange.
11. The method of claim 10 wherein determining whether number portability processing is required includes determining whether the signaling message includes a number portability status indicator indicating whether a number portability lookup for the called party number has already been performed.
12. The method of claim 10 wherein determining whether number portability processing is required includes determining whether the signaling message includes a JIP parameter corresponding to an originating switch for a ported calling party number.
13. The method of claim 10 wherein querying the number portability database includes querying the number portability database only in response to determining that at least one of the numbers is within a portable exchange.
14. The method of claim 1 wherein querying the network number portability database using information contained in one of the received signaling

messages includes querying the network number portability database using a called party number.

15. The method of claim 1 wherein querying the network number portability database using information contained in one of the received signaling messages includes querying the network number portability database using a calling party number.
16. The method of claim 1 wherein querying the network number portability database using information contained in one of the received signaling messages includes querying the network number portability database using a called party electronic mail address.
17. The method of claim 1 wherein querying the network number portability database includes querying a local number portability (LNP) database.
18. The method of claim 1 wherein incorporating information returned from the network number portability database into the CDR includes incorporating a location routing number (LRN) into the CDR.
19. The method of claim 1 wherein incorporating information returned from the network number portability database into the CDR includes incorporating a service provider identifier (SPID) into the CDR.
20. The method of claim 1 wherein delivering the CDR to a downstream system includes delivering the CDR to at least one of a billing application, a billing verification application, a usage measurements application, and a fraud detection application.

21. A method for generating accurate call detail records based on call signaling messages collected from a single location in the network, the method comprising:
- 5 (a) receiving signaling messages copied from a location in a first network and generating a CDR based on the signaling messages;
- (b) determining whether the CDR contains calling or called party information that requires a number portability translation; and
- 10 (c) in response to determining that the called or called party information requires number portability translation, querying a number portability database and using information returned from the number portability database to complete the CDR.
22. The method of claim 21 wherein receiving signaling messages copied from a location in a first network includes receiving signaling messages copied from a location upstream from a location at which a number portability lookup is performed for a call.
- 15 23. The method of claim 21 wherein querying the number portability database includes, in response to determining that the called and calling party information requires a number portability translation, inserting the called and calling party information into a single query and forwarding the query to the number portability database.
- 20 24. The method of claim 21 wherein querying the number portability database includes, in response to determining that the calling party

information requires a number portability translation, querying the number portability database using the calling party information.

25. The method of claim 21 wherein querying the number portability database includes, in response to determining that the called party information requires a number portability translation, querying the number portability database using called party information.
26. The method of claim 21 comprising, in response to determining that the called and calling party information in the CDRs do not require number portability translation, reconciling the CDRs without performing a number portability database query.
27. A method for generating call detail records (CDRs) in a communications network that supports number portability, the method comprising:
- (a) copying a plurality of signaling messages associated with a call or transaction;
 - (b) correlating the signaling messages to produce a CDR for the call or transaction;
 - (c) querying a network number portability database using information contained in one of the copied signaling messages; and
 - (d) incorporating information returned from the network number portability database into the CDR, wherein performing steps (a)-(d) includes performing steps (a)-(d) without suspending the call or transaction.

28. The method of claim 27 wherein copying a plurality of signaling messages includes copying the signaling messages using a link probe coupled to a signaling link.
29. The method of claim 27 wherein copying a plurality of signaling
5 messages includes copying the signaling messages using a message copy function internal to a signaling message routing node.
30. The method of claim 27 wherein copying the signaling messages includes copying the signaling messages at a monitoring location upstream from a location in which a number portability lookup occurs for
10 the call or transaction.
31. A monitoring system for generating a call detail record (CDR) in a communications network environment that supports number portability, the system comprising:
- 15 (a) means for passively copying a plurality of signaling messages relating to a plurality of different calls or transactions;
- (b) means for automatically correlating signaling messages from the plurality of signaling messages that relate to the same call or transaction into a CDR usable by a plurality of different network data collection applications;
- 20 (c) a number portability reconciliation (NPR) monitoring system operatively associated with the means for correlating for determining whether number portability processing is required for

the CDR, and, in response to determining that number portability processing is required, for querying a number portability database using information contained in one of the received signaling messages, and for updating the CDR using information obtained
5 from the number portability database; and

(d) means associated with the NPR system for delivering the CDR to a downstream application.

32. The monitoring system of claim 31 wherein the means for passively copying includes a plurality of communications link probes for monitoring
10 signaling links external to a signaling node.

33. The monitoring system of claim 31 wherein the means for passively copying includes a probeless network monitoring system associated with a network routing node.

34. The network monitoring system of claim 31 wherein the means for
15 automatically correlating is adapted to generate a CDR including a superset of message parameters required by the plurality of different applications.

35. The network monitoring system of claim 31 wherein the means for
20 automatically correlating is adapted to correlate ISDN user part (ISUP) messages to form the CDR.

36. The network monitoring system of claim 31 wherein the means for automatically correlating is adapted to correlate transaction capabilities application part (TCAP) messages to form the CDR.
37. The network monitoring system of claim 31 wherein the means for
5 automatically correlating is adapted to correlate IP telephony signaling messages to form the CDR.
38. The network monitoring system of claim 31 wherein the NPR monitoring system is adapted to query a local number portability database.
39. The network monitoring system of claim 31 wherein the NPR monitoring
10 system is adapted to query a mobile number portability database.
40. The monitoring system of claim 31 wherein the NPR monitoring system is adapted to determine whether the calling or called party exchange is portable in determining whether number portability processing is required.
- 15 41. The network monitoring system of claim 40 wherein, in response to determining that the called party exchange is portable, the NPR monitoring system is adapted to examine a number portability status indicator in one of the received signaling messages to determine whether a number portability database lookup has already been performed for the
20 called party number.
42. The network monitoring system of claim 41 wherein the NPR monitoring system is adapted to refrain from performing a number portability

database lookup based on the called party number in response to determining that a number portability database lookup has already been performed for the called party number.

43. The network monitoring system of claim 40 wherein, in response to
5 determining that the calling party exchange is portable, the NPR monitoring system is adapted to determine whether a JIP parameter corresponding to an originating end office is present in the message.
44. The network monitoring system of claim 43 wherein the NPR monitoring
10 system is adapted to refrain from performing a number portability database lookup based on the calling party number in response to determining that a JIP parameter corresponding to an originating end office is present in the message.
45. The network monitoring system of claim 31 wherein, in response to
15 determining that number portability processing is required, the NPR monitoring system is adapted to extract a location routing number from the number portability database and to update the CDR to include the location routing number.
46. The network monitoring system of claim 31 wherein, in response to
20 determining that number portability processing is required, the NPR monitoring system is adapted to query the number portability database via an Internet protocol network.

47. The network monitoring system of claim 31 wherein, in response to determining that number portability processing is required, the NPR monitoring system is adapted to query the number portability database via an SS7 signaling network.
- 5 48. The network monitoring system of claim 31 wherein the means for delivering is adapted to deliver the CDR to at least one of a billing application, a billing verification application, and a fraud detection application.